

Synthesis of TPU applied to the skin layer of the dashboard

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Abstract

Thermoplastic polyurethanes series were synthesized using polyol (diol and triol), isocyanate (MDI, HDI, IPDI, TDI, etc.) and 1,4-BD as chain extender. Mechanical properties were evaluated using Universal Testing Machine (UTM), and thermal stability was evaluated by Thermos Gravimetric Analysis (TGA). TPUs containing triols had a change in physical properties. Synthesized TPUs exhibited high mechanical properties and heat-resisting property for instrument panel applications.

Objective

1. Blending polyols and isocyanates contents to make TPUs
2. Viscosity comparison according to TPUs synthesis time
3. Evaluation the physical properties and comparisons according to NCO index

Blending polyols and isocyanates

NCO index of high mechanical properties

Comparison of properties after triol addition polymerization

Future additives, reinforcing agents and plasticizer combinations

Experimental

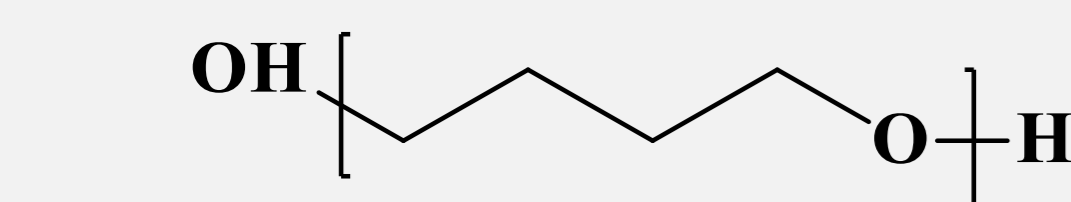
Polyol (PTMG, PEG, etc.)

Isocyanate (MDI, HDI, etc.)

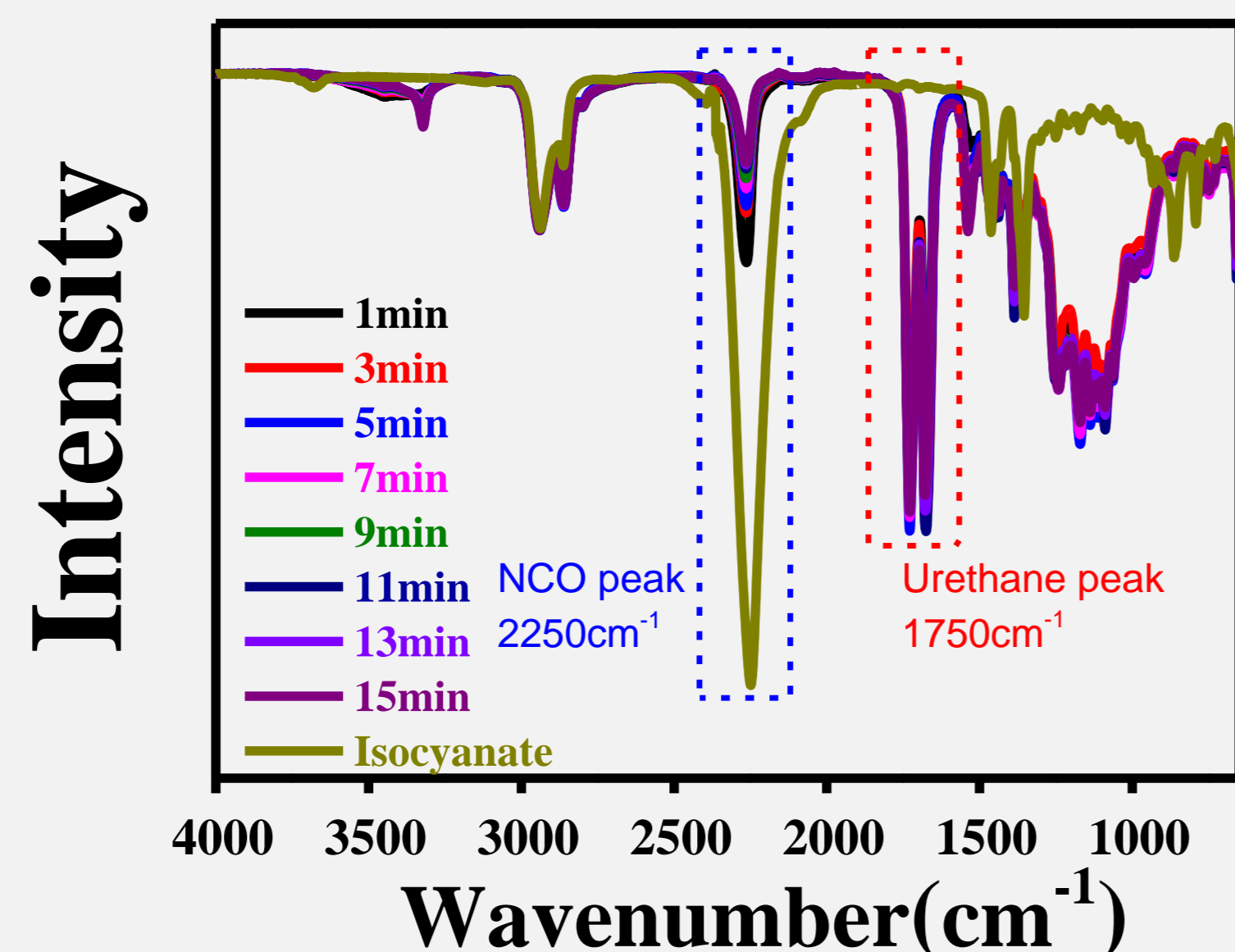
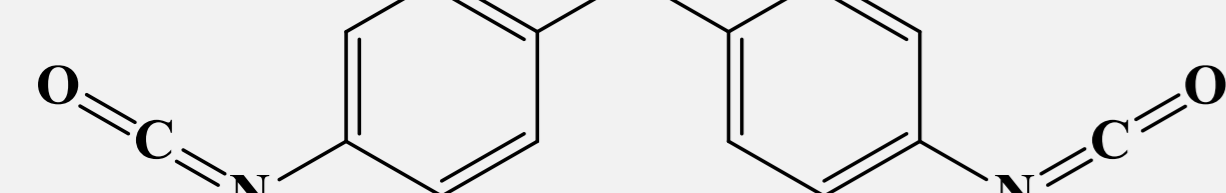
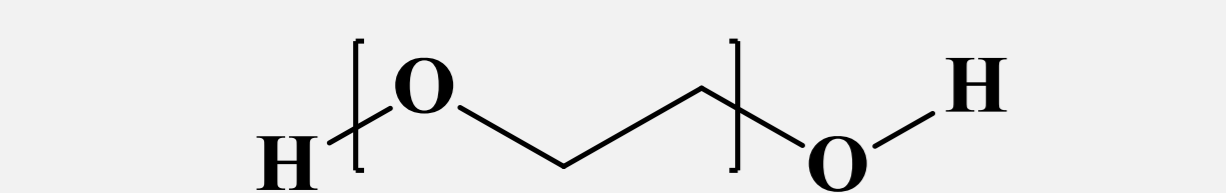
Chain extender (EG, BD, etc.)



Please note that it is difficult to provide materials and synthesis schemes as the experiment is proceeding.

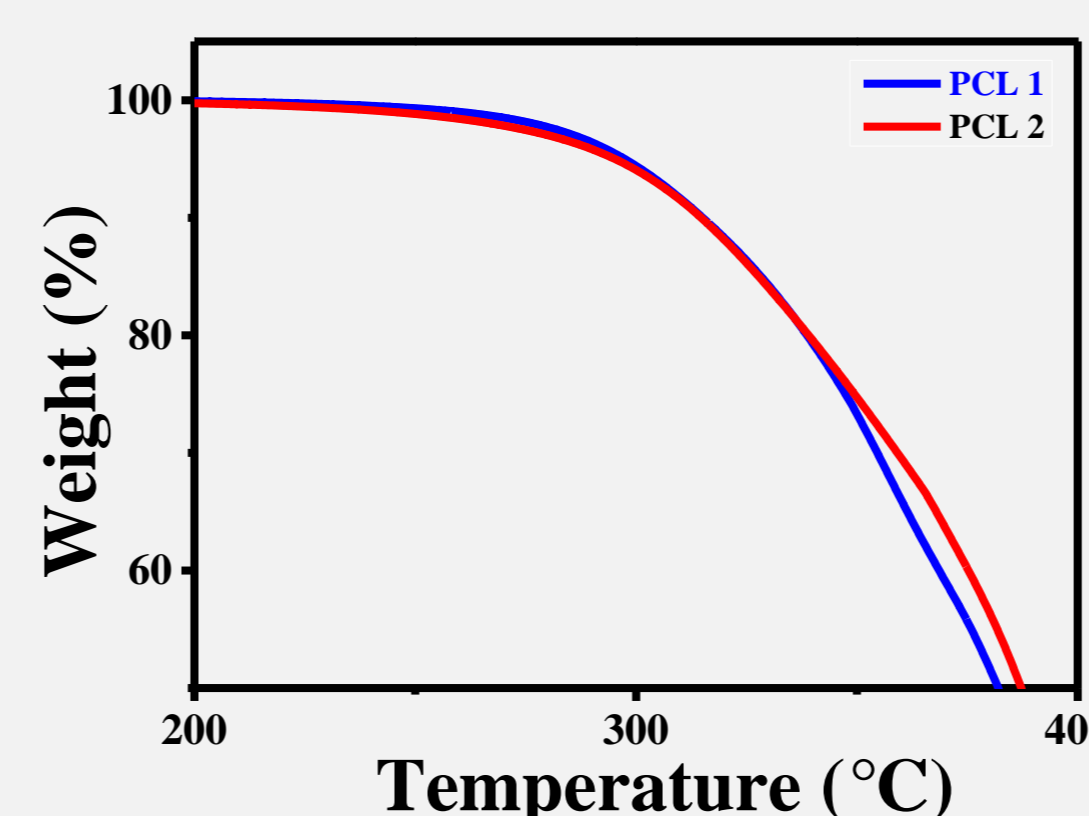
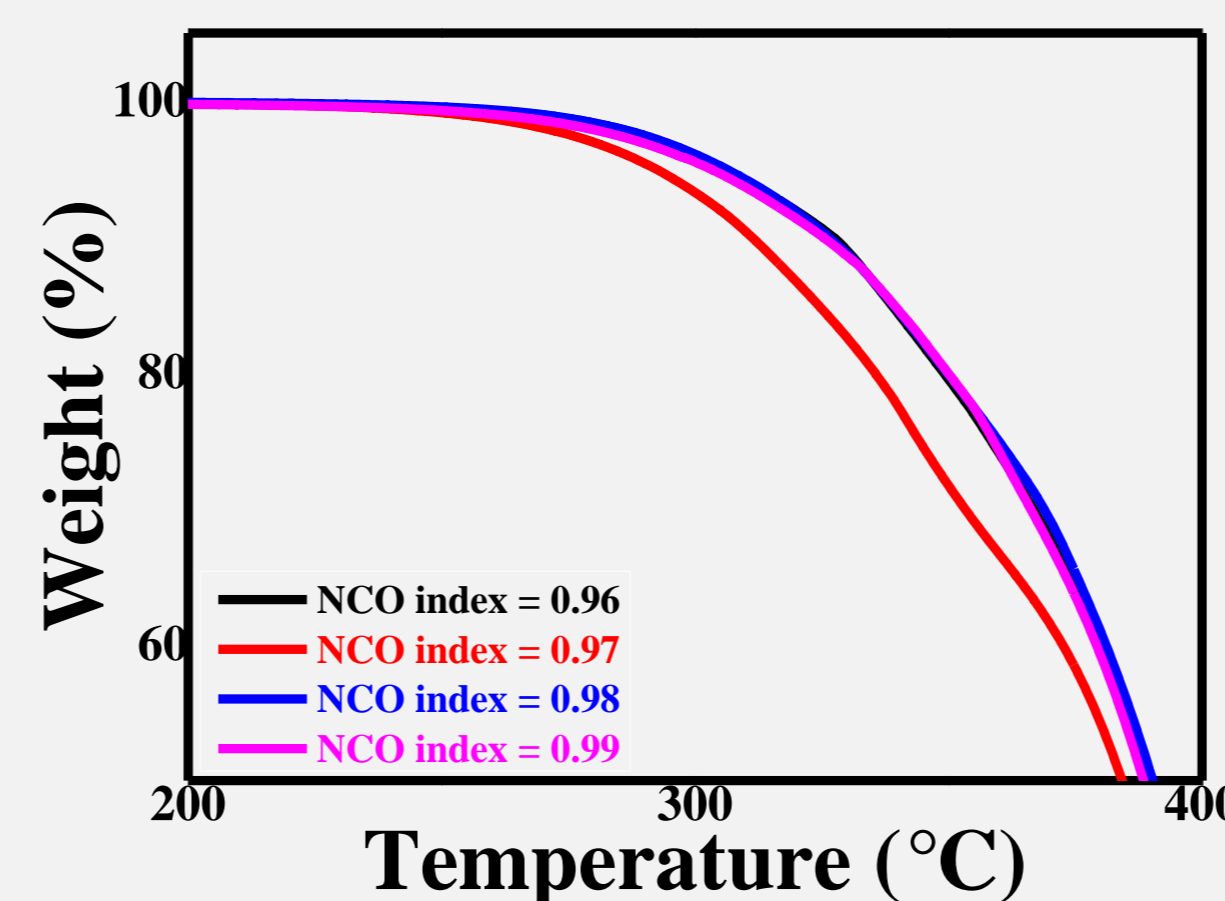


FT-IR



Results

TGA

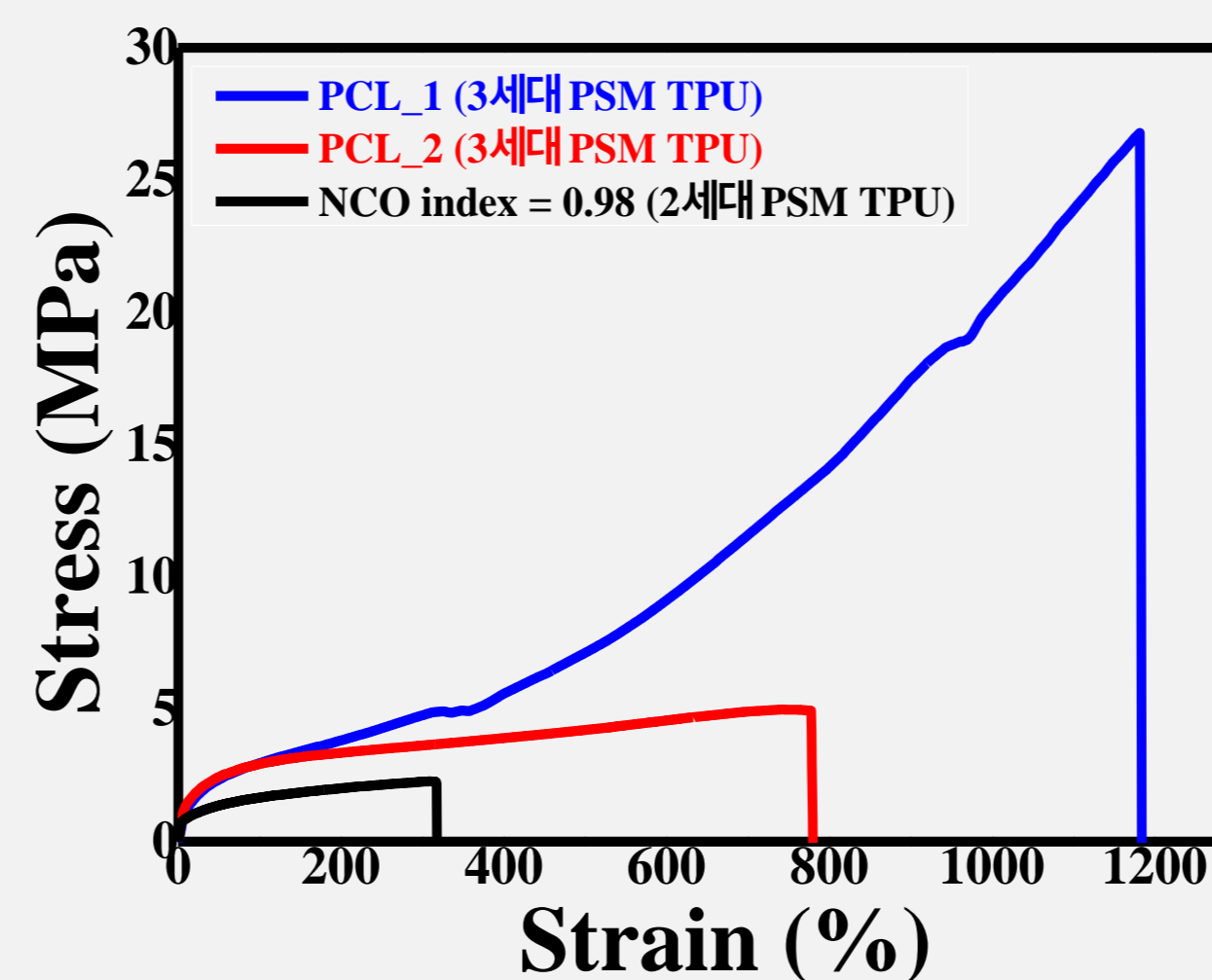
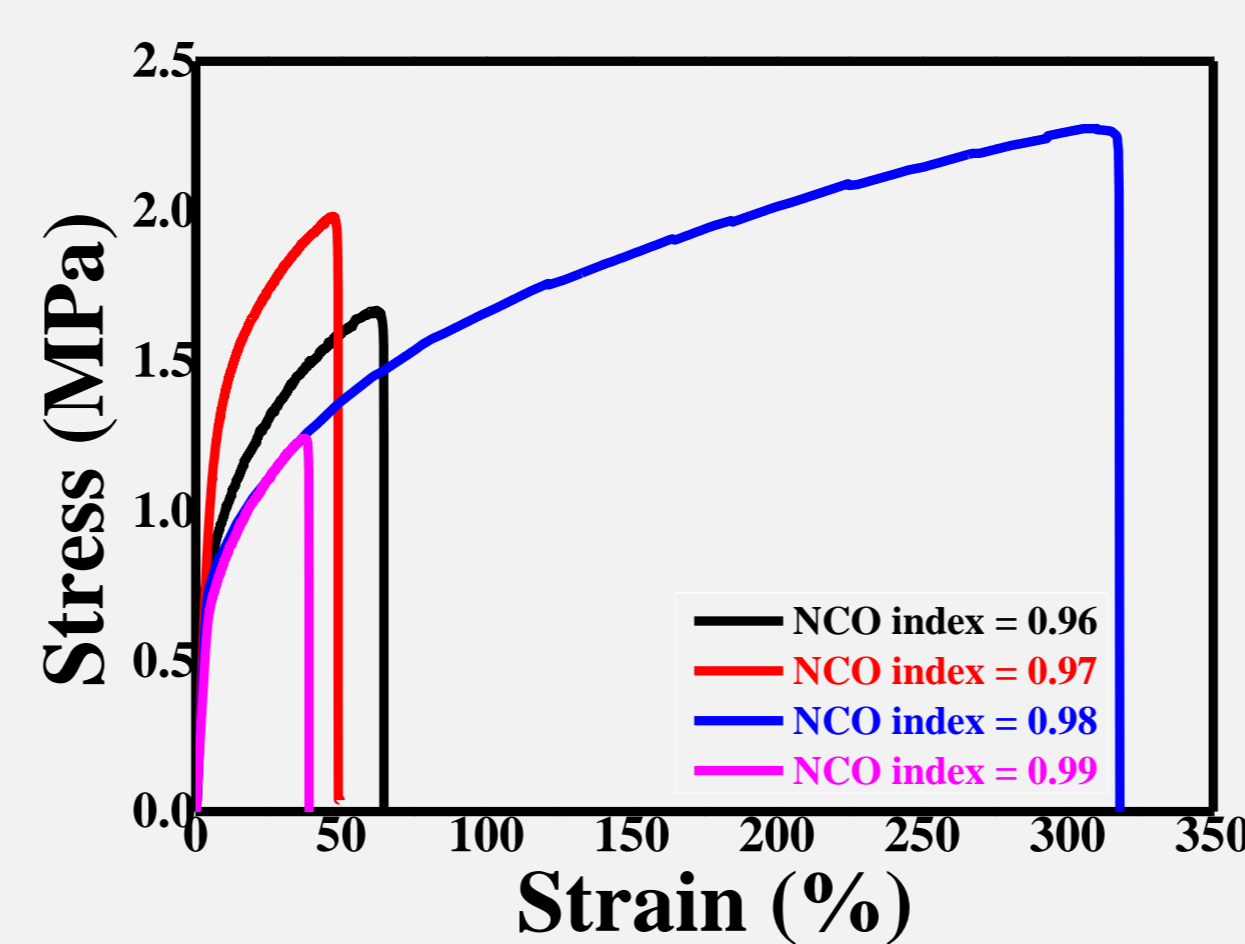


Measures

NCO index	Weight % : 100 → 90 의 T _d 온도 (°C)	Weight % : 100 → 50 의 T _d 온도 (°C)
0.96	323.59	388.85
0.97	311.15	384.25
0.98	326.35	390.35
0.99	321.42	388.51

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UTM



Measures

NCO Index	Young' s Modulus (MPa)	Maximum Stress (MPa)	Percent Strain (%)
0.96	0.0268	1.6699	62.2163
0.97	0.0399	1.9836	49.7730
0.98	0.0063	2.2758	363.373
0.99	0.0335	1.2432	37.1246

NCO Index	Young' s Modulus (MPa)	Maximum Stress (MPa)	Percent Strain (%)
NCO Index = 0.98	0.0063	2.276	30
PCL_1	10.2720	26.782	1227.100
PCL_2	21.1350	4.990	816.230

Conclusion

- Successful instrument panel TPU synthesis
- Structural analysis and viscosity measurement of synthesized TPU
- Check the change of mechanical properties according to the change of NCO index (Excellent mechanical properties of NCO index #3)

Acknowledgement

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